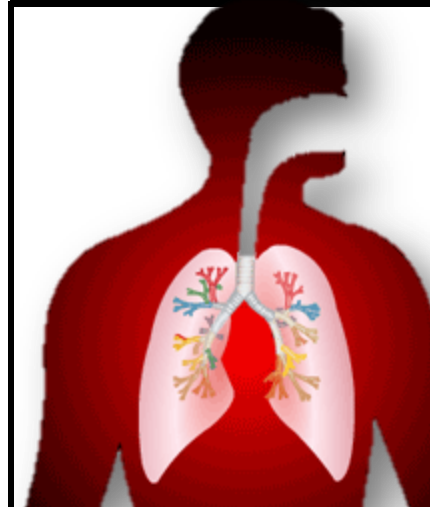


RESPIRATORY BLOCK SYSTEM

LECTURE1 : BRONCHIAL ASTHMA

Objectives:

- 1) Understanding asthma as an episodic, reversible bronchoconstriction caused by increased responsiveness of the tracheobronchial tree to various stimuli.
- 2) knowing that asthma is divide into basic types : extrinsic or atopic allergic and intrinsic asthma.
- 3) Understanding the morphological changes seen in the lungs in cases of severe asthma

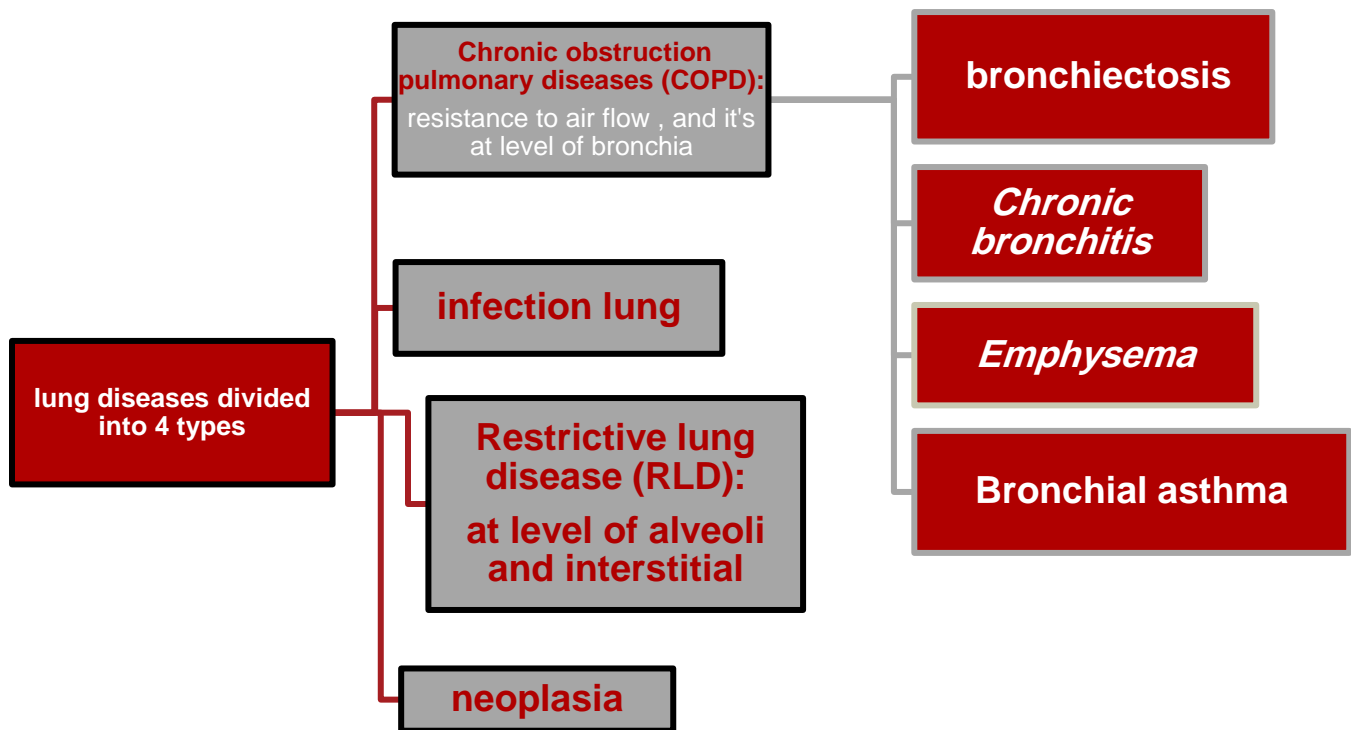


تنويه : هذا العمل ليس مصدر اساسي للمذاكرة
وإنما هو مجهود طلاب وطالبات

-it will be good if you study immune lecture before

-- The questions are very important.

- contact us : pathology433@gmail.com



- Symptoms of lung diseases :

- wheezing - dyspnea (difficulty with breathing) - chest pain - dry or wet (productive) cough
- hemoptysis نفث الدم (blood-stained sputum from the bronchi, larynx, trachea, or lungs)

- **Normal investigation of lung diseases:**

- X-ray
- CT-scan
- In the lab look sputum cytology to see if there infection

-**Specific investigation of lung diseases :**

- Bronchoscope > to take bronchial biopsy
- Broncho lavage

*If it is in the alveoli we can't use these machines, we use open lung biopsy, it's specific for restrictive lung diseases, or when we don't know the diagnosis.

BRONCHIAL ASTHMA (BA):

Def.: it's episodic reversible chronic obstructive disease caused by abnormal response from bronchial tree to various stimuli

It has been divided into **two basic types:**

1. **Extrinsic asthma.**
2. **Intrinsic asthma**

(Sometimes extrinsic and intrinsic can **co-exist** in the same patient)

Clinical presentation : **Mainly** wheezing expiration , dyspnea (during night and early morning or in certain season , and coughing (**not mainly**)).

Pathogenesis: certain stimuli (**antigen**) enter bronchial tree with the air, and stimulate T helper lymphocyte, which transport into active T2 helper (Th2), to secrete **IL-4, IL-5, IL-13**

IL-4 : stimulate lymphocyte to secret IgE " immunoglobulin responsible of bronchial asthma " the IgE have special receptor on the mast cell ,if the IgE bind to it . Release histamine " **Bronchoconstriction**, Vasodilatation "

IL-5: stimulate eosinophil to release antihistamine and major basic protein which cause destruction for bronchus wall, and that destruction lead to stimulate vagus nerve which cause bronchospasm

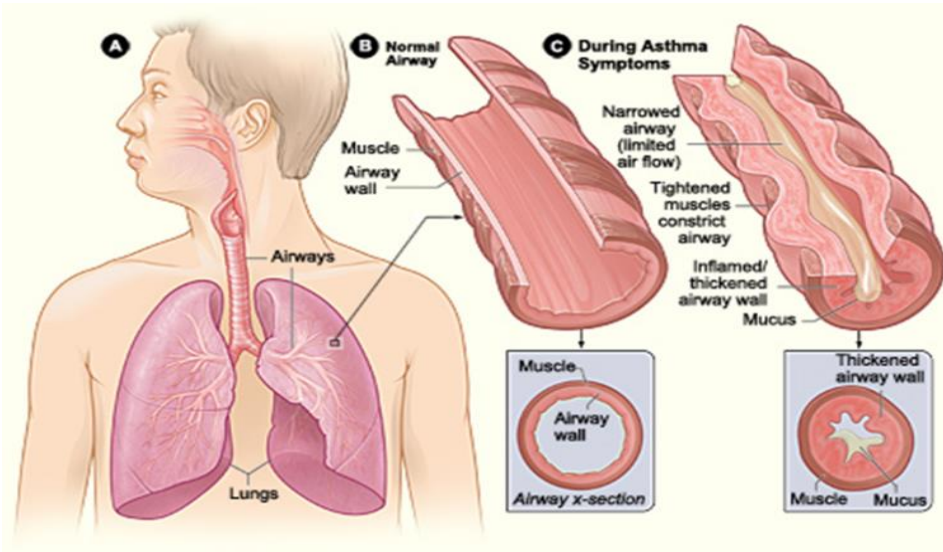
IL-13: stimulate IgE releasing, and mucus production

	Extrinsic Asthma 70%	Intrinsic Asthma 30%
known as	allergic, immune mediated, atopic or reaginic asthma	non-atopic , non- immune mediate or Idiosyncratic
Initiated by	Initiated by <u>Type 1 hypersensitivity reaction</u> induced by exposure to extrinsic antigen/allergens e.g. food, pollen, dust, etc.	Initiated by diverse خلل , non-immune Mechanisms , associated whit chronic bronchitis e.g. <u>infections</u> , <u>drugs like aspirin</u> , <u>pollutants</u> , <u>inhaled chemical irritants</u> , <u>cold</u> , <u>stress</u> and <u>exercise</u> .
Age of development	Develop early in life (Childhood)	Develop later in life (older people)
history of Allergic reaction	<u>usually in children with a personal or family history</u> of allergic disease	No personal or family history of allergic reaction
Serum levels of IgE & eosinophils	Usually are elevated.	Normal
Skin test with antigen	positive	Negative

Morphology of Asthma:

Grossly: lung over distended (over inflation), occlusion of bronchi and bronchioles by thick mucous.

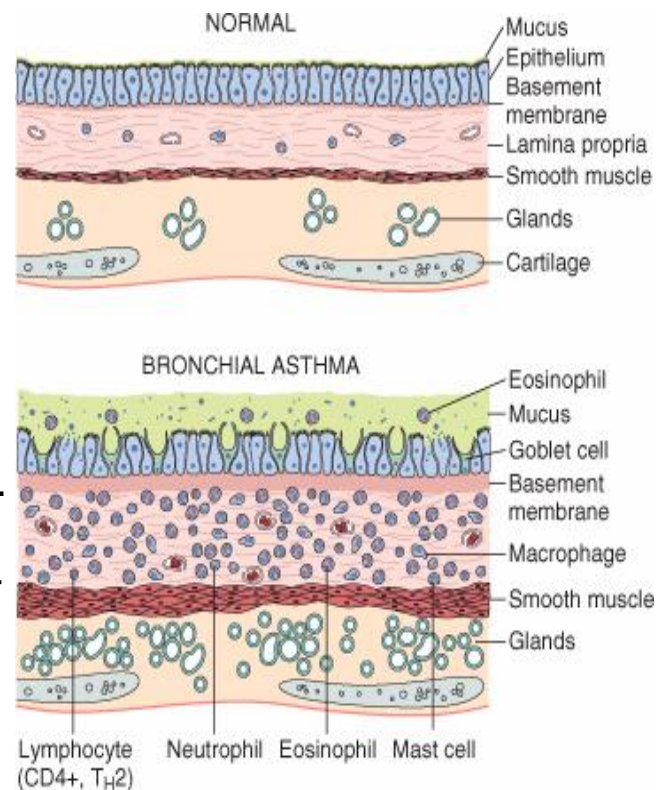
the bronchi have thickened walls with narrowed lumina and generally are filled with plugs of mucus in acute attack



Morphology of Asthma:

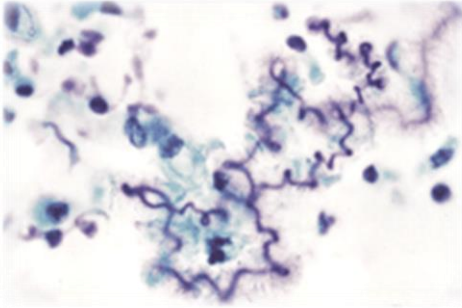
Histologic finding:

- Thick basement membrane there may be infiltration of eosinophils.
- Edema and inflammatory infiltrate in bronchial wall.
- Chronic mucous plug formation.
- mucous contain Curschmann spirals, eosinophil and Charcot-Leyden crystals.
- Submucosal glands increased.
- Hypertrophy of the bronchial wall muscle.



Curschmann spirals

- Coiled
- Basophilic
- plugs of mucus formed in the lower airways
- found in sputum and tracheal washings.



Charcot-Leyden crystals.

- Eosinophilic
- needle-shaped
- crystalline structures.



COMPLICATIONS OF ASTHMA

- **Airway remodeling:** structural changes in the airway with a progressive loss of lung function that increase airflow obstruction and airway responsiveness.
- **Superimposed infection** i.e. pneumonia
- **Chronic bronchitis** (i.e. Asthmatic bronchitis: chronic bronchitis with superimposed asthma)
- **Emphysema, pneumothorax and pneumomediastinum**
- **Bronchiectasis**
- **Respiratory failure** requiring intubation in severe exacerbations i.e. status asthmaticus
- In some cases **cor pulmonale and heart failure** develop.

Prognosis

- ▣ asthma in childhood outgrow their disease in adulthood require no further treatment.
- ▣ Patients with poorly controlled asthma develop airway remodeling
- ▣ Many patients who develop asthma at an older age also tend to have chronic symptoms.

Prevention

- ▣ Control of factors contributing to asthma severity.
- ▣ evaluate patients with persistent asthma for allergen exposures and sensitivity to seasonal allergens. Skin testing results should be used to assess sensitivity to common indoor allergens.
- ▣ avoid exposure to allergens to which the patients are sensitive.

Status asthmatics:

it's acute medical emergency of bronchial asthma. The patient have acidosis, cyanosis, hypoxia and hypercapnia which may lead to death

SUMMARY

Types

- 1) Extrinsic asthma: Type 1 Hypersensitivity reaction, IgE, childhood, family Hx of allergy.
- 2) Intrinsic asthma: associated e bronchial exercise, cold induced. No Hx of asthma, aspirin, allergy

Morphology

Hypertrophy of bronchial smooth muscle & hyperplasia of goblet cells e eosinophils
Mucous plug e Curschmann spirals & Charcot-Leyden crystals.

Complication

Superimposed infection •
Chronic bronchitis •
Pulmonary emphysema •
Status asthmaticus •

Questions

1. COPD is a group of diseases characterized by ?

Airflow obstruction , decrease in forced expiration volume (FEV1).

2.Restrictive pulmonary diseases (RPD) is a group of diseases characterized by ?

Reduce lung capacity due to either chest wall or skeletal abnormalities.

3. Which antibody involve in extrinsic asthma ? And which type of reaction is mediated by ?

IgE, type 1 hypersensitivity reaction.

4. What is the most common type of asthma ?

Atopic (extrinsic).

5. Which test use to diagnosis of atopic asthma ?

Radioallergosorbent (RASTs).

6.What is the clinical features of asthma ?

Severe dyspnea, wheezing, difficulty in expiration.

7. What dose the mucus plug contain histologicly?

Cruschmann spirals, numerous eosinophils and **charcot leyden crystals** (collection of crystalloid made up of eosinophl protein)

8. How we know the **charcot leyden crystals** came from the lung or not?

If there is alveolar macrophage that's mean it is from the lung.

9. what is the airway remodeling ?

Sub-basement membrane **thickening** and **hypertrophy** of bronchial glands and **smooth muscles**.

10. Why aspirin can cause asthma?

Aspirin inhibit the cyclooxygenase pathway of arachidonic acid metabolism **without** affecting the lipoxygenase route , thereby shifting the balance of production toward leukotriens like (C4, E4, D4) and that cause bronchospasm

11- what is the characteristics of asthma ?

asthma is chronic inflammatory disorder characterized by coughing, wheezing, breathlessness

12. In sputum histology test of asthmatic patient what we should see ?

Eosinophil, thickened mucosa

13 Why status asthmaticus lead to the death ?

because it's associated with acidosis, hypercapnia (increase CO₂ level), and severe hypoxia

14 which viruses can cause intrinsic(non atopic) asthma ?

Parainfluenza virus, and rhino virus

MCQs

1- which of the following activate eosinophils in bronchial asthma ?

- A- IL-4
- B- IL-5
- C- IL-28
- D- Th2

2- which of the following is the most common type of asthma ?

- A- type I hypersensitivity.
- B- type II hypersensitivity.
- C- type III hypersensitivity.
- D- type IV hypersensitivity.

3- A patient of 19 years old come to ER with his friend , after a bad dusty storm and he complains from shortness of breathing and cough and feeling tired at night so he could not sleep well. Which of the following do you think is correct ?

- A- bronchial asthma
- B- lung TB
- C- pulmonary eosinophilia
- D- acute pneumonia

4- Asthma is more common in:

- A. Adult
- B. Same
- C. Children

5- In Extrinsic Asthma the serum levels of IgE is:

- A. Low
- B. High
- C. Normal

6. Which type of Asthma is related to allergic reactions?

- A. Extrinsic Asthma
- B. Intrinsic Asthma
- C. Idiosyncratic

7. Which one of the following types of asthma is induced when exposure to allergen:

- A. Chronic asthma
- B. Extrinsic asthma
- C. Intrinsic asthma

8. Which one of the following statements is true about allergic bronchial asthma:

- A. IG E-mediated type I hypersensitivity.
- B. Increased amount of basophils
- C. It is common in adults.
- D. None of them

9. A 23-years old male came to the clinic complaining from tachypnea, tightness of the chest and dry cough particularly at night.

On auscultation, the doctor was able to hear the wheezing sounds over his chest while expiration.

What is the most likely diagnosis:

- A. Bronchial asthma
- B. Sinusitis
- C. Bronchitis
- D. Tuberculosis

ANSWERS:

- 1- B
- 2-A
- 3-A
- 4-C
- 5-B
- 6-A
- 7-B
- 8-A
- 9-A